

Printer Protocol Interpreter (PPI) ZGL™

*Programmer's Reference Manual for ZGL,
a Zebra® ZPL® Printer Protocol Interpreter*



Thermal Series Printers

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Programmer's Reference Manual for ZGL,
a Zebra ZPL Printer Protocol Interpreter***

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1

Introduction

About This Manual

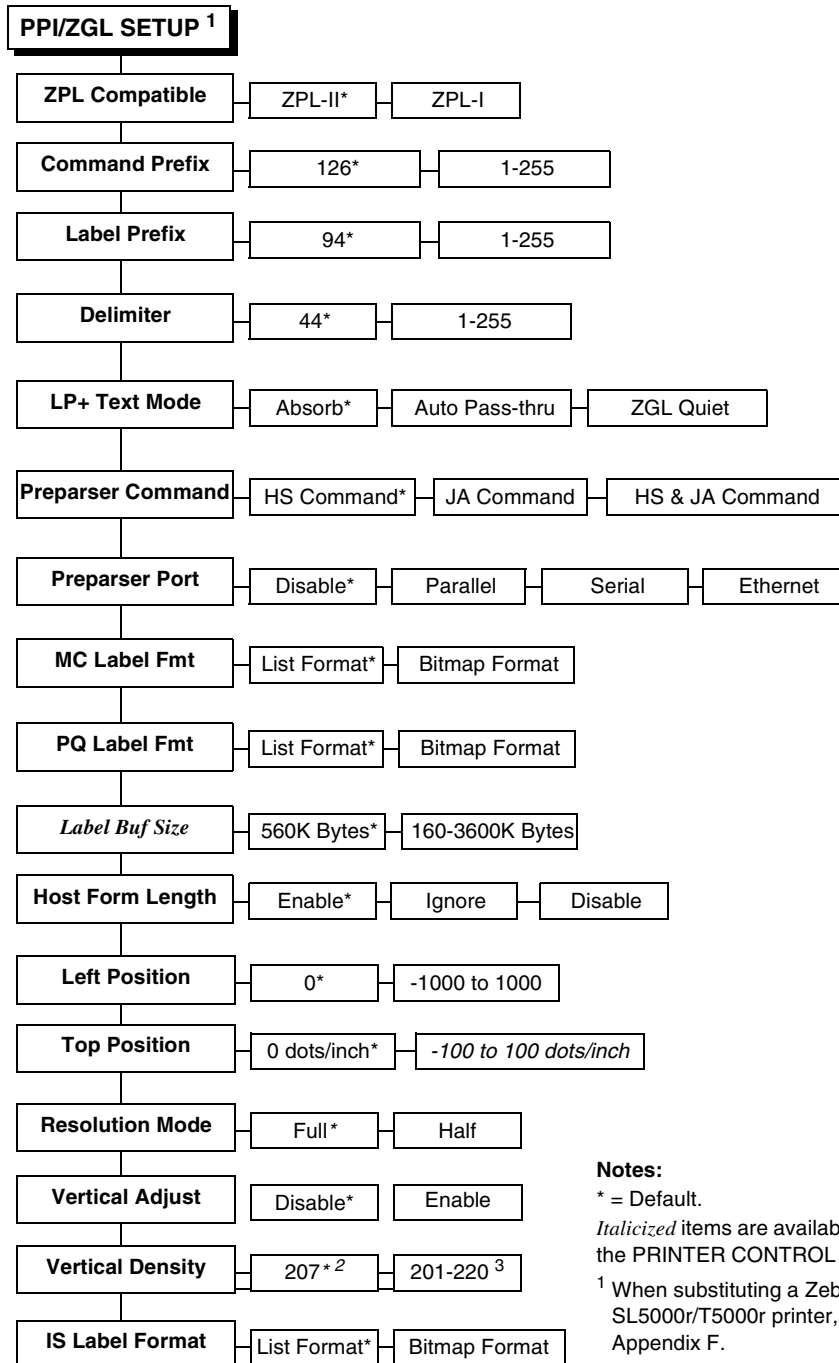
This manual explains the differences between the Printer Protocol Interpreter Zebra Graphic Language (ZGL) Utility and the Zebra® ZPL® language. Use this manual with your *SL500r/T5000r User's Manual* for complete printer-protocol operation.

NOTE: When substituting a Zebra Xi III model printer with a SL5000r/T5000r printer, refer to ZGL Menu Conversions on page 37.

Coax/Twinax Interface Requirements

ZGL uses a forms prefix of EBCDIC 0xB0. This is a valid code point for SCS but not for DSC/DSE. If you are using the DSC/DSE mode, you must select a different code point for DSC. Refer to the *Coax/Twinax Programmer's Reference Manual* for instructions on how to select a different code point.

PPI/ZGL SETUP Menu



(Continued on next page)

Notes:

* = Default.

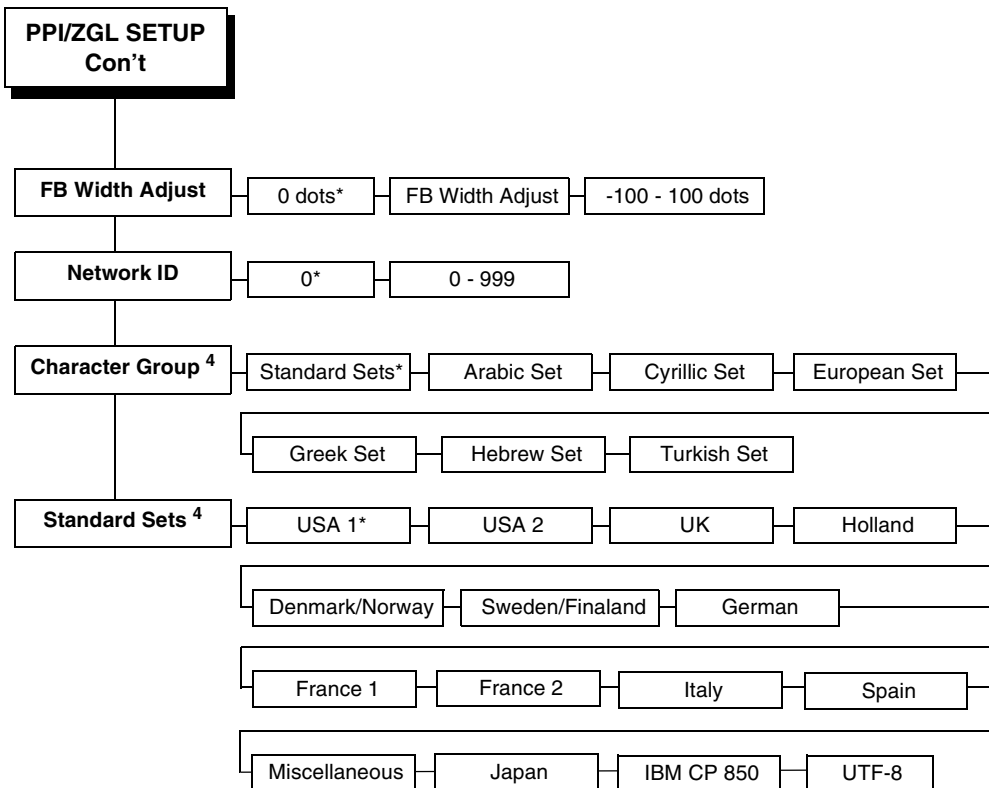
Italicized items are available when you enable Admin User (in the PRINTER CONTROL menu).

¹ When substituting a Zebra Xi III model printer with a SL5000r/T5000r printer, refer to the menu conversion in Appendix F.

² Factory default for printers with 203 dpi printhead = 207 dpi. Factory default for printers with 300 dpi printhead = 301 dpi.

³ Range for printers with 203 dpi printhead = 201 - 220 dpi. Range for printers with 300 dpi printhead = 301 - 330 dpi.

⁴ Each character set will contain different individual characters. PPI uses scalable fonts rather than bitmapped fonts.



Notes:

* = Default.

Italicized items are available when you enable Admin User (in the PRINTER CONTROL menu).

¹ When substituting a Zebra Xi III model printer with a SL5000r/T5000r printer, refer to the menu conversion in Appendix F.

² Factory default for printers with 203 dpi printhead = 207 dpi.
Factory default for printers with 300 dpi printhead = 301 dpi.

³ Range for printers with 203 dpi printhead = 201 - 220 dpi.
Range for printers with 300 dpi printhead = 301 - 330 dpi.

⁴ Each character set will contain different individual characters. PPI uses scalable fonts rather than bitmapped fonts.

PPI/ZGL SETUP Submenus

ZPL Compatible

This menu allows you to select the compatibility to ZPL-I or ZPL-II.

- ZPL-I = Zebra Programming Language I.
- ZPL-II = Zebra Programming Language II.

The default is ZPL-II.

Command Prefix

This item allows you to select the prefix for the control instructions command. The range is 1-255, and the default is 126.

Label Prefix

This item allows you to select the prefix for the format instructions command. The range is 1-255, and the default is 94.

Delimiter

This item allows you to select the delimiter used to separate the parameter of a command.

The range is 1-255, and the default is 44.

LP+ Text Mode

PPI supports text printing using the LP+ emulation.

- **Absorb** (default). Use this setting for ZPL compatibility. This setting absorbs non-PPI data.
- **Auto Pass-thru**. Use this setting for text printing. Non-PPI data is passed to the LP+ emulation.
- **ZGL Quiet**. All data and PPI commands are passed to the LP+ emulation.

Preparser Command

The incoming data will be checked for the string “HS” or “JA” prior to entering the ZGL emulation parser based on the HS Command or the JA Command. Once the string is detected, the command will take effect immediately.

The default is HS Command.

Preparser Port

- **Disable** (default). Disables the Preparser Command feature.
- **Parallel**. Select Parallel if the data is coming to the printer through the parallel port.
- **Serial**. Select Serial if the data is coming to the printer through the serial port.

MC Label Fmt

The ^MC command determines whether the printed label image should be retained for use in the immediately following label definition. The MC Label Fmt option determines the internal format to be used for storing the label image: list format or bitmap format.

- **List Format** (default). Works for most applications and should be used for applications where memory is sufficient.
- **Bitmap Format**. Should be used in applications where a large amount of data is sent. Bitmap format has greater efficiency of memory use. The label image of the next label is overlaid on the bitmap of the current label (instead of accumulating a list of stored print elements like List Format, which might eventually run out of memory in a large print job).

PQ Label Fmt

Allows selection of two methods of using Print Quantity Label Formats (^PQ) for printing a label from memory.

- **List Format** (default). A list of all stored print elements (graphics, text, and barcodes) is reprocessed and executed again for each label. Works for most applications.
- **Bitmap Format**. The bitmap of the first label is stored and copied over for each label printed without reprocessing a list of all print elements. Should be used in applications that print labels of the same data only, as it provides better print speed.

Label Buf Size

This option allows you to set the label buffer size.

The buffer is used to store the data from ^XA up to ^XZ for command processing. The maximum size of the buffer cannot exceed the amount of available memory in the system. If a menu value greater than the amount of memory available is selected, the menu value will be set to the amount available. To increase the amount of available memory, increase the Glob Mem Adjust setting (under the PRINTER CONTROL menu).

Also, the new buffer size only takes effect upon power-up, so do a Save Config. for the new setting and select that config as the Power-up.

The range is 160K Bytes to 3600K Bytes, and the default is 560K Bytes.

Host Form Length

Selects whether the Label Length set in the menu or sent by the host software command is used.

- **Enable** (default). Label length will be determined by the ^LL command if it is present. If the ^LL command is not present, it will be based on the Label Length value in the QUICK SETUP or MEDIA CONTROL menu.
- **Ignore**. Label length as determined by the ^LL command is ignored.
- **Disable**. Label length will be determined by the Label Length value in the QUICK SETUP or MEDIA CONTROL menu.

Left Position

The ^LS command specifies a horizontal offset to be added to all label element positions. The Left Position option displays the value specified by the ^LS command and provides an alternative method for specifying the horizontal offset.

The default is 0.

Top Position

The value of this option specifies a vertical offset to be added to all label element positions in dots per inch. For example, if the value is 3 and the current form length is 6 inches, then 18 dots will be added to element's vertical position.

The range is -100 to 100 dots/inch, and the default is 0 dots/inch.

Resolution Mode

The ^JM command determines the apparent print resolution of the printed label. If half resolution mode is selected by the ^JM command, the printed output of a 300 dpi printer matches that printed by a 150 dpi printer (half resolution). This essentially doubles the size of the label image, including label dimensions. If full resolution mode is selected, the output is printed normally. The Resolution Mode option displays and selects the current setting associated with the ^JM command.

The default is Full.

Vertical Adjust

This option allows you to enable or disable vertical density adjustment.

- Disable (default). No vertical density adjustment will take place.
- Enable. Vertical density adjustment is active and will use the Vertical Density value selected.

Vertical Density

When Vertical Adjust = Enable, this option allows you to fine tune the vertical print density (in the paper motion direction) on printers with 203 or 300 dpi print heads. The result is that the vertical position and height will be changed accordingly. Selecting a greater vertical density value causes the image to compress or expand vertically on the label.

On printers with 203 dpi printhead, the range is 201-220 dpi, and the default is 207 dpi.

On printers with 300 dpi printhead, the range is 301-330 dpi, and the default is 300 dpi.

IS Label Format

The ^IS command saves the printed label image by name for later recall as part of a label definition. The IS Label Fmt option determines the internal format to be used for storing the label image: list format or bit format.

- **List Format** (default). Should be used for most applications due to its greater efficiency of data process.
- **Bitmap Format**. Should be used in applications that frequently recall the saved label image, in which case the bitmap storage format provides the better print speed.

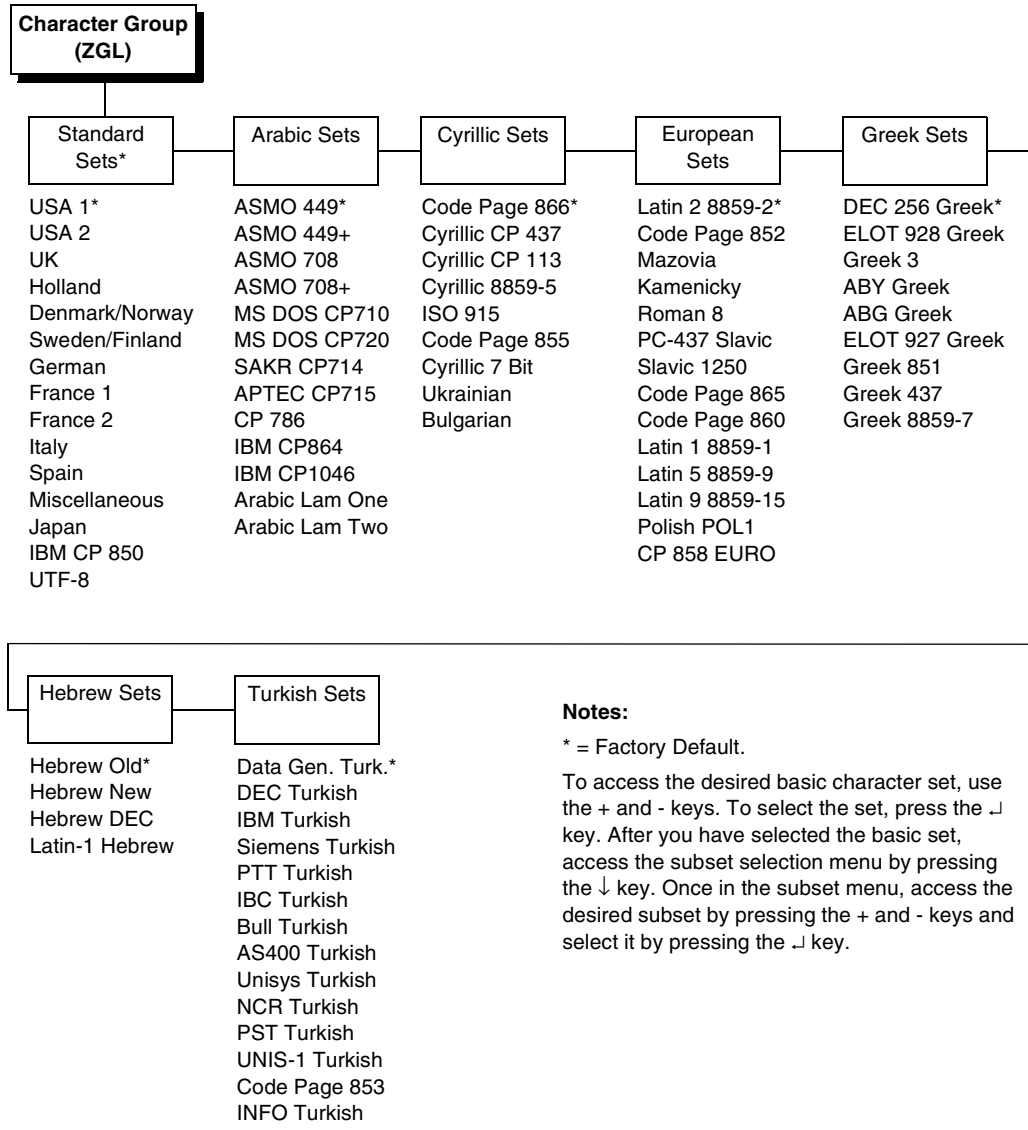
FB Width Adjust

The FB Width Adjust command allows the user to adjust (increase or decrease) the width of field block from the field block command ^FB, so that the text line in the block can be broken at a different word.

The selection is from -100 to 100 dots. The default is 0 dot.

Character Group And Character Sets

This menu item selects the character set used by the printer. The available character sets are shown below.



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Fully Supported Commands

^Bx - Barcodes

This command selects various barcodes. PPI supports the following ZPL barcodes:

^B1	Code 11
^B2	Interleaved 2 of 5
^B3	Code 39
^B5	Planet
^B7	PDF417
^B8	EAN-8
^B9	UPCE
^BA	Code 93
^BC	Code 128
^BD	UPS Maxicode
^BE	EAN-13
^BI	Industrial 2 of 5
^BK	Codabar
^BL	Logmars
^BM	MSI
^BP	Plessey
^BR	RSS
^BS	UPC/EAN Extensions
^BU	UPCA
^BV	BC412
^BX	Data Matrix
^BZ	Postnet

NOTE: ^BP Plessey does not support optional printing of checkdigit in PDFs.

PPI also supports these additional barcodes:

^B\$A	UPC-E0
^B\$B	UPCSHIP
^B\$C	EAN/UCC-128
^B\$D	FIM
^B\$E	German Interleaved 2 of 5

The syntax of the extended barcode commands differs from the standard PPI barcode commands in that the extended commands require a dollar sign (\$) between the ^B and the character designator for the barcode. Refer to Chapter 3 for additional programming information.

When barcodes are generated on printers with unique print densities, the dot ratio of the wide/narrow bar/space does not match the ZPL printer. Match the exact number of dots shifted for each density through trial and error.

^BY - Barcode Defaults

This command changes default settings associated with barcodes, including the narrow bar width, the ratio of the wide bar to the narrow bar, and the barcode height.

~CC / ^CC - Change Caret

This command changes the format instruction prefix, usually the caret (^).

~CD / ^CD - Change Delimiter

This command changes the command parameter delimiter.

^CF - Change Alphanumeric Default Font

This command changes the default font selection and default character size.

~CT / ^CT - Change Tilde

This command changes the command instruction prefix, usually the tilde (~).

^CV - Bar Code Validation

The ^CV command enables and disables the bar code validation function. When validation is enabled, the barcode data is checked for error conditions such as invalid characters, incorrect check digits, and data field errors.

^DD - Download Direct Bitmap

This command downloads an image directly to the label bitmap rather than being stored in memory (as the ~DG command does).

^DF - Download Format

This command saves the PPI format instructions as a text string into a file stored in the printer DRAM or other designated storage device. The format can contain Field Number (^FN) instructions to be referenced when the file is recalled with the ^XF command.

~DN - Abort Download

This command aborts the downloading of a graphics bit-image (~DG command) before the specified number of bytes have been input.

~DU - Download Unbounded TrueType Font

This command downloads unbounded true type fonts to the printer.

~EF / ^EF - Erase Format

This command deletes all label formats stored with the ^DF Download Format command.

~EG / ^EG - Erase Downloaded Images

This command deletes all graphics images previously stored in RAM with various commands (^IS, ~DG, etc.).

^FA - Field Allocate

This command allocates space for a dynamic field.

^FC - Field Clock

This command sets the clock indicators and the clock mode when used with the Real Time Clock hardware.

^FD - Field Data

This command denotes the start of “data” for a field (as used in text and barcode elements).

^FH - Field Hex

This command allows entering a “hex” value into a ^FD, ^FV, or ^SN data string.

^FN - Field Number

This command works in conjunction with the ^DF (Download Format) and the ^XF (Recall Format) commands and allows dynamic data to be merged with a previously stored label definition.

^FO - Field Origin

This command assigns the x and y position coordinates (relative to the label “home” position) to the field.

^FR - Field Reverse

This command provides the ability to reverse print fields. Any field immediately followed by this command is “XOR’d” against the label bitmap.

^FS - Field Separator

This command denotes the end of a field definition (as used in text and barcode elements).

^FT - Field Type Set

This command sets the x/y coordinate (relative to the “home” position) of a subsequent field. It differs from the ^FO command in that the coordinate is always for the left end of the “baseline” of a field regardless of rotation.

^FW - Field Orientation

This command sets the default rotation for commands that have a rotation parameter that is left blank.

^FX - Comment

This command allows comments that do not print to be placed in the label definitions.

^GB - Graphics Box

This command generates boxes and lines. It is also used in conjunction with reversed fields.

^GC - Graphic Circle

This command generates circles. It is also used in conjunction with reversed fields.

^GD - Graphic Diagonal Line

This command generates diagonal lines. It is also used in conjunction with reversed fields.

^GE - Graphic Ellipse

This command generates ellipses. It is also used in conjunction with reversed fields.

^GS - Graphic Symbol

This command generates any of the five special symbols: registered trademark, copyright, trademark, UL, and CSA.

~HI - Host Identification

This command returns a string to the host, including the printer model, software version, dots per millimeter setting, memory size, and other options.

^HG - Host Graphic

This command uploads a graphic image from RAM or Flash to the host.

^HV - Host Verification

This command sends back the data in a ^FN (Field Number) field to the host.

^HY - Upload Graphic

This command uploads different graphic image formats from RAM or Flash to the host.

^IL - Image Load

This command recalls an entire label graphic image previously stored in RAM for overlaying with other label data which follows this command.

^IM - Image Move

This command recalls the stored graphic bit-image and places it on the label (without magnification).

^IS - Image Save

This command saves an entire label in RAM as a graphic image for recalling later and for overlaying with other label data.

~JA - Cancel All

This command cancels the current label printing (if any) and clears any label definition data queued in the PPI input buffer. ~JA is a preparer command which is processed immediately when the command is sent. Before sending the command set the menu options "Preparer Command" and "Preparer Port" accordingly.

~JL - Set Label Length

This command performs a calibration and sets the label length. For ZGL, the related menu option is under Media Control ► Set Label Length. Select the Automatic option to set the label length according to the calibration length.

^JM - Set Half Density

This command sets the printer density to half.

^JR - Power On Reset

This command resets the printer to the power-up state.

^JX - Cancel Partial Input Format

This command cancels any partial label definition data queued in the PPI input buffer.

^LH - Label Home

This command sets the "home" *x/y* coordinate used as a reference for all positioning commands, and, therefore, allows an entire label to be moved without changing the individual element position commands.

^LL - Label Length

This command defines the length of a label in printer dots. Any label printed on continuous media causes the defined length of media to be moved.

^LR - Label Reverse

This command provides the ability to reverse print ALL fields following the ^LR in a label (in contrast with the ^FR command which reverse prints only an individual field).

^LS - Label Shift

This command shifts the “home” position to the left by a defined number of dots. It is used so that the label definitions for printers where narrow media is “right justified” works on printers that are “left justified.”

^LT - Label Top

This command shifts the label image vertically on the media.

~Lx - Base Emulation Support

PPI supports text printing using the LP+ emulation. See Chapter 3.

^MM - Print Mode

This command determines what happens after a label has been printed: tear off, rewind, peel off, continuous, and cutter.

^MT - Media Type

This command selects the type of media used: thermal transfer or direct thermal.

^MU - Mode Units

This command selects the measurement units in commands having parameters, which specify distance, height, or width.

~NC - Network Connect

This command connects a particular printer to a network by calling up the printer’s network ID number.

^NI - Network ID Number

This command assigns a network ID number to the printer. This must be done before the printer can be used in a network.

~NR - Set All Network Printers Transparent

This command sets all printers in the network to transparent, regardless of the ID or current mode.

~NT - Set Currently Connected Printer Transparent

This command sets the currently connected network printer to transparent.

^PM - Print Mirror Image of Label

This command prints the entire label as a “mirror image.”

^PW - Print Width

This command sets the print width.

^SF - Serialization Field

This command allows the user to serialize a standard ^FD string.

^SL - Set Mode/Language

This command specifies the mode of operation for the Real Time Clock and the language in which Real Time Clock information is printed.

^SN - Serialized Data

This command provides the ability to increment or decrement alphanumeric fields in a repeated label.

^SO - Set Offset

This command sets the offset for second clock or third clock from the primary Real Time Clock.

^ST - Set Date/Time

This command sets the date and time of the Real Time Clock.

^SZ - Set ZPL

This command selects the programming language used by the printer.

^TA - Tear Off Adjust

This command adjusts the media rest position relative to the tear-off bar after the label is printed.

^XA - Label Start

This command defines the start of a label definition.

^XB - Suppress Backfeed

This command improves throughput in tear off mode by keeping labels from feeding forward to the tear bar while printing successive label definitions.

^XF - Recall Format

This command recalls a label definition previously stored with the ^DF Download Format command and merges ^FN dynamic fields to produce a label.

^XG - Recall Graphic

This command recalls a stored graphic bit-image and places it on the label.

^XZ - Label End

This command denotes the end of a label definition.

3

Command Enhancements And Differences

^A@ - Select Font by Name

This command only applies to built-in fonts or bitmap fonts downloaded via the ~DB command.

^Ax - Select Alphanumeric Font

PPI uses scalable fonts rather than bitmapped fonts.

^B\$x - Barcodes

PPI includes the following barcodes:

^B\$A - UPC-E0

Command Format: ^B\$A *fp, hgt, rdt, pos, chk*

a: UPC-E0 barcode command

fp: Barcode orientation

N = No Rotation (Default)

R = Rotate 90 degrees, clockwise

I = Rotate 180 degrees, inverted

B = Rotate 90 degrees, counter-clockwise

hgt: Barcode Height

Value entered in dots at the printer dpi.

The default is 10 dots or the height set by the ^BY command.

If the height exceeds the label length, then the barcode is cut off at the bottom of the label.

rdt: Human readable data

Y = Print human readable data (Default)

N = No human readable data

pos: Human readable data print position

Y = Print it above the barcode

N = Print it below the barcode (Default)

chk: Mod-10 Check Digit

Y = Calculate and print check digit (Default)

N = No check digit

^B\$B - UPCSHIP

Command Format: ^B\$B *fp, hgt, rdt, pos*

b: UPCSHIP barcode command

fp: Barcode orientation

N = No Rotation (Default)

R = Rotate 90 degrees, clockwise

I = Rotate 180 degrees, inverted

B = Rotate 90 degrees, counter-clockwise

hgt: Barcode Height

Value entered in dots at the printer dpi.

The default is 10 dots or the height set by the ^BY command.

If the height exceeds the label length, then the barcode is cut off at the bottom of the label.

rdt: Human readable data

Y = Print human readable data (Default)

N = No human readable data

pos: Human readable data print position

Y = Print it above the barcode

N = Print it below the barcode (Default)

^B\$C - EAN/UCC-128

Command Format: ^B\$C *fp, hgt, rdt, pos, chk*

c: EAN/UCC-128 barcode command

fp: Barcode orientation

N = No Rotation (Default)

R = Rotate 90 degrees, clockwise

I = Rotate 180 degrees, inverted

B = Rotate 90 degrees, counter-clockwise

hgt: Barcode Height

Value entered in dots at the printer dpi.

The default is 10 dots or the height set by the ^BY command.

If the height exceeds the label length, then the barcode is cut off at the bottom of the label.

rdt: Human readable data

Y = Print human readable data (Default)

N = No human readable data

pos: Human readable data print position

Y = Print it above the barcode

N = Print it below the barcode (Default)

chk: Mod-103 Check Digit (only applies to subset C)

Y = Calculate and print check digit

N = No check digit (Default)

^B\$D - FIM

Command Format: ^B\$D *fp, type, height*

d: FIM barcode command

fp: Barcode orientation

N = No Rotation (Default)

R = Rotate 90 degrees, clockwise

I = Rotate 180 degrees, inverted

B = Rotate 90 degrees, counter-clockwise

type: Type of FIM barcode. Only four choices are valid:

A (default), B, C, and D.

^B\$E - German Interleaved 2 of 5

Command Format: ^B\$E *fp, hgt, rdt, pos*

e: German Interleaved 2 of 5 barcode command

fp: Barcode orientation

N = No Rotation (Default)

R = Rotate 90 degrees, clockwise

I = Rotate 180 degrees, inverted

B = Rotate 90 degrees, counter-clockwise

hgt: Barcode Height

Value entered in dots at the printer dpi.

The default is 10 dots or the height set by the ^BY command.

If the height exceeds the label length, then the barcode is cut off at the bottom of the label.

rdt: Human readable data

Y = Print human readable data (Default)

N = No human readable data

pos: Human readable data print position

Y = Print it above the barcode

N = Print it below the barcode (Default)

^CI - Select International Set

Each character set contains different individual characters. PPI uses scalable fonts rather than bitmapped fonts.

Table 1. Printer Character Sets by Group

Group Name	Character Set Name	Character Set ID
Standard Sets	USA 1	000
	USA 2	001
	UK	002
	Holland	003
	Denmark/Norway	004
	Sweden/Finland	005

Standard Sets (cont.)	German	006
	France 1	007
	France 2	008
	Italy	009
	Spain	010
	Miscellaneous	011
	Japan	012
	IBM CP 850	013
Arabic Sets	ASMO 449	100
	ASMO 449+	101
	ASMO 708	102
	ASMO 708+	103
	MS DOS CP710	104
	MS DOS CP720	105
	SAKR CP714	106
	APTEC CP715	107
	CP 786	108
	IBM CP864	109
	IBM CP1046	110
	Arabic Lam One	111
	Arabic Lam Two	112
Cyrillic Sets	Code Page 866	200
	Cyrillic CP 437	201
	Cyrillic CP 113	202
	Cyrillic 8859-5	203
	ISO 915	204
	Code Page 855	205
	Cyrillic 7 Bit	206
	Ukrainian	207
	Bulgarian	208

European Sets	Latin 2 8859-2	300
	Code Page 852	301
	Mazovia	302
	Kamenicky	303
	Roman 8	304
	PC-437 Slavic	305
	Slavic 1250	306
	Code Page 865	307
	Code Page 860	308
	Latin 1 8859-1	309
	Latin 5 8859-9	310
	Latin 9 8859-15	311
	Polish POL1	312
	CP 858 EURO	313
	Greek Sets	DEC 256 Greek
ELOT 928 Greek		401
Greek 3		402
ABY Greek		403
ABG Greek		404
ELOT 927 Greek		405
Greek 851		406
Hebrew Sets	Hebrew Old	500
	Hebrew New	501
	Hebrew DEC	502
	Latin-1 Hebrew	503
Turkish Sets	Data Gen. Turk.	600
	DEC Turkish	601
	IBM Turkish	602
	Siemens Turkish	603
	PTT Turkish	604
	IBC Turkish	605

Turkish Sets (cont.)	Bull Turkish	606
	AS400 Turkish	607
	Unisys Turkish	608
	NCR Turkish	609
	PST Turkish	610
	UNIS-1 Turkish	611
	Code Page 853	612
	INFO Turkish	613

^CW - Font Identifier

PPI uses scalable fonts rather than bitmapped fonts. The device naming convention differs as follows:

ZPL device specifiers:

- R: DRAM
- B: Optional Memory
- E: Extra EPROM
- Z: Standard EPROM

PPI device specifiers:

- R: DRAM
- B: FLASH
- Z: Standard Fonts

~DB - Download Bitmap Font

Downloaded bitmap fonts are stored in flash with the .bmp, rather than .fnt, extension. The device naming convention differs as follows:

ZPL device specifiers:

- R: DRAM
- B: Optional Memory
- E: Extra EPROM
- Z: Standard EPROM

PPI device specifiers:

- R: DRAM
- B: FLASH
- Z: Standard Fonts

~DG - Download Graphics

The device naming convention differs as follows:

ZPL device specifiers:

R: DRAM

B: Optional Memory

E: Extra EPROM

Z: Standard EPROM

PPI device specifiers:

R: DRAM

B: FLASH

Z: Standard Fonts

~DY - Download Graphic

The device naming convention is the same as ~DG. The command does not currently support AR - compressed bitmap font.

^FB - Field Block

PPI scalable fonts use proportional character spacing and may have different inter-character gaps. As a result, the formatting of text using the Field Block command may cause some words to overwrite each other at the end of the block.

^FV - Field Variable Data

This command works in conjunction with the ^MC (Map Clear) command and allows variable fields to be printed with static fields of the previous label bitmap to produce the current label. PPI may not keep the previous label as a bitmap, but as text.

^GF - Graphic Field

In binary data mode, data is interpreted as strict binary and may be in the range hex 00 through FF. Because of the wider range of acceptable data values, instruction prefix characters do NOT abort the data, and PPI continues reading data until the required number of bytes is acquired.

~HM - Host Memory Status

This command returns three memory values (in kilobytes) to the host:

- the total amount of RAM installed in the printer
- the maximum amount of RAM available to the user
- the amount of RAM currently available to the user

Currently, only the second and third values are implemented.

^HR - Calibrate RFID Transponder Position

This command initiates an RFID transponder calibration for a specific RFID label and returns the results to the host computer.

~HS - Host Status Return

The ~HS command returns various printer status information to the host. The status information is returned in three separate strings, each of which contains several sub-fields. Currently, three sub-fields contain status information: the Partial Format flag, the Label Remaining in Batch value, Communication Setting, Paper Out flag, Pause flag, Label Length, Head Up flag, Ribbon Out flag, and Label Waiting flag. The remaining sub-fields are returned with dummy values for the purpose of allowing host applications to run correctly.

~HS is a preparer command, which is processed immediately when the command is sent. Before sending the command, set the menu options "Preparser Command and "Preparser Port" accordingly.

^HW - Host Directory List

This command returns a directory list of objects in a specific memory area (storage device) back to the host with object names and object size. Currently, the command only lists the objects stored in DRAM.

^ID - Item Delete

The device naming convention differs as follows:

ZPL device specifiers:

- R: DRAM
- B: Optional Memory
- E: Extra EPROM
- Z: Standard EPROM

PPI device specifiers:

- R: DRAM
- B: FLASH
- Z: Standard Fonts

NOTE: The ZGL ^ID command only deletes font (*.FNT and *.ttf) and graphics logos (*.GRF) from both DRAM and Flash. It does not delete the stored format (*.ZPL).

^J\$E - Switch Emulation

This command is used to switch emulations from ZGL to PGL or VGL:

- ^J\$E PGL → Switch to PGL
- ^J\$E VGL → Switch to VGL

~JD / JE - Disable/Enable Diagnostics

The hex dump format is different from the ZPL format. In addition, communication errors may not be displayed. This command also changes the value of the related front panel option.

^JE - Disable Diagnostics

This command disables Hex Dump mode.

~JP - Pause & Cancel

The PPI ONLINE light is illuminated when the printer is online.

^JU - Configuration Update

This command controls whether the printer reprints a label after a fault condition clears.

^JU *op, num*

op = Configuration update operation to perform.

F: Load factory configuration

R: Load saved configuration number *num*

S: Save current configuration as power-up configuration number *num*

num = Configuration number to load, used only when *op* = R or S

^JV - Configuration Update

This command saves/loads the configuration **^JV***a[,m]*

a = F: Load factory emulation

S: Save configuration and as power-up configuration

R: Load saved configuration

m = 1 ... 8 (config number)

^JZ - Reprint After Error

The current setting is reflected in the corresponding front panel value. The conditions which generate a fault are determined by, and may be unique to, PSA.

~Lx - Base Emulation Support

PPI supports text printing using the LP+ emulation.

In addition to the three front panel LP+ Text Mode selections, there are three PPI commands which allow you to select the LP+ Text Mode through the data stream:

~L0 - LP+ Text Mode = Absorb (ZPL compatibility)

~L1 - LP+ Text Mode = Auto Pass-thru

~L2 - LP+ Text Mode = ZGL Quiet

With LP+ Text Mode set to "Absorb," all non-PPI data is absorbed including any system-generated line terminators.

When LP+ Text Mode is set to “Auto Pass-thru,” non-PPI data is automatically detected and passed through to the LP+ emulation (PPI data is processed normally). If the hex commands 0x02 or 0x03 are received, they are treated as binary data and passed through to the LP+ emulation; they are not treated as the equivalent ^XA and ^XZ commands. System-generated line terminators within commands are also passed through as binary data to the LP+ emulation and not absorbed, as they are in the “Absorb” mode.

If LP+ Text Mode is set to “ZGL Quiet,” all data (including all PPI commands except ~L0, ~L1, and ~L2) are passed through to the LP+ emulation. When an ~Lx command is received, the corresponding front panel setting is updated to reflect the current LP+ Text Mode value.

Text printing is useful in debugging label definitions, as it allows the incoming data to be printed without entering hex dump mode. Simply placing ~L2 before the label definition (to enter Quiet mode) and ~L0 or ~L1 after it (to return to PPI command processing) causes the label definition commands to be printed rather than executed. Text generated via the base emulation is not part of overlay data for any repetitive job.

^MC - Mp Clear

This command controls clearing of the label bitmap after printing. PPI may not keep the previous label as a bitmap, but as text.

^MD - Media Darkness

Identical darkness values may not produce the same darkness on your printer as ZPL.

^MN - Media tracking

This command selects the type of media the printer is using: continuous, transmissive, or reflective.

^PF - Slew Dot Rows

With PPI, a slew speed increase may not occur since PSA slew definition and use may be different than ZPL.

~PH / ^PH - Slew to Home

The PPI ONLINE light is illuminated when the printer is online.

^PO - Print Orientation

The following orientation parameter values are allowed:

- N: No rotation (Normal)
- R: Rotate 90 degrees (Landscape)
- I : Rotate 180 degrees (Inverted)
- B: Rotate 270 degrees (Inverted Landscape)

~PP / ^PP - Programmable Pause

The ~PP command takes the printer offline as soon as the current label being printed is completed. The exact moment at which this occurs in the label stream may not match exactly. The ^PP command takes the printer offline after the label definition in which the command appears is finished printing.

^PQ - Print Quantity

The ^PQ command controls printing operations such as the number of labels to print, labels printed before the printer pauses, and replications of each serial number.

~PR / ^PP - Print Rate

This command sets the print speed of the printer in inches per second. The exact set of available speed settings provided by the PPI is printer dependent and may not match those available through ZPL.

^RB - Define EPC Data Structure

This command defines the structure of EPC data, which can be read from or written to an RFID tag.

^RF - Read or Write RFID Format

This command allows you to read or write to an RFID tag. For PTX, the starting block number is one, since we only have one block of tag data. Zebra provides additional blocks but they are not being used.

^RM - Enable RFID Motion

This command enables or disables RFID motion. When disabled, Zebra does not move the label. PTX moves the label if there is data to print on the label. When enabled, both Zebra and PTX moves the label.

^RR - Specify RFID Retries for Read/Write

This command changes the number of times that the printer attempts to read or write to a tag. By default, Zebra attempts six retries. PTX attempts two retries. The command value ranges from 0 to 10 for Zebra and 1 to 9 for PTX.

NOTE: However, zero is not an available option for the SL5000r/T5000r printer.

^RS - RFID Setup

This command sets up parameters including tag type, read/write position of the transponder, and error handling. Currently, only the read/write position of the transponder and label retry are supported by PTX.

^RT - Read RFID Tag

This command tells the printer to read the current RFID tag data. For PTX, the starting block number is one, since we only have one block of tag data. Zebra provides additional blocks but they are not being used.

^RZ - Set RFID Tag Password

This command lets you define the password for the tag during writing.

~SD - Set Darkness

Identical darkness values may not produce the same relative darkness on your printer as ZPL. This command overrides the current value of the darkness setting front panel option.

^SP - Start Print

With ZPL I selected, this command is ignored. With ZPL II selected, printing does not start until ^XZ is received.

^SX - Set Alert

This command requests the printer to send an alert message when a certain condition is set or clear.

The serial port is the only supported destination for route alert.

PQ Done is the only supported condition type. If both condition set and condition clear are enabled, a message will be sent immediately while the job is still in progress and another message will be sent when the job is complete.

~WC - Print Configuration

PPI uses the Printronix configuration format.

^WD - Print Directory

The PPI format of this directory may differ from the ZPL format.

^WT - Write RFID Tag

This command allows you to program the current RFID tag with the data. For PTX, the starting block number is one, since we only have one block of tag data. Zebra provides additional blocks but they are not being used.

AUTOEXEC Bootup File

PPI supports this feature via the PTR SETUP capability to process files in battery-backed RAM or flash memory on power-up.

Missing Characters with Font E (OCR-B)

PPI uses the PSA OCR-B character sets, which may differ from other manufacturers. Among others, characters 0x5B, 0x5C, and 0x5D are different.

A

ZGL Menu Conversions

When substituting a Zebra Xi III model printer with a SL5000r/T5000r printer, refer to the ZGL conversion table below.

Table 2: ZGL Menu

Zebra Xi III Series	SL5000r/T5000r with ZGL Emulation
Darkness - (0 to +30) +10* . Darkness of image on label.	QUICK SETUP Menu, Print Intensity - (-15 to +15) -3*
Tear Off - (-120 to +120) +0* . Adjusts Tear Off, Peel-Off and Cut position in Dot Rows.	QUICK SETUP Menu, Paper Feed Shift - (-0.50 to +12.8) 0.00 Inch* . Adjusts Tear Off, Tear-Off Strip, Peel-Off & Cut position in Inches or MM.
Print Mode – Rewind Tear-Off Peel-Off Cutter Applicator	QUICK SETUP Menu, Media Handling - Continuous (same as Zebra Rewind) Tear-Off Strip* (same as Zebra Tear-Off) Peel-Off (same as Zebra Peel-Off) Cut (same as Zebra Cutter) Tear-Off (similar to Zebra Peel-Off) N/A Applicator N/A on SL5000r/T5000r
Media Type - Continuous* , Non-Continuous. Sensor Type - Web - Liner gap, notch or hole. NOTE: Media Type must = Non-Continuous. Mark - Black mark on underside of label (Media Type must = Non-Continuous).	QUICK SETUP Menu, Gap/Mark Sensor-Disable* - Same as Zebra Continuous Media Type (no label length indicators). Non-Continuous N/A. Assumed when Gap, Adv Gap or Adv Notch selected. NOTE: Use Gap, Adv Gap or Adv Notch for Zebra Web. NOTE: No Media Type setting is available or required. Gap - Liner gap, notch or hole. Adv Gap - Use w/dark background labels Adv Notch - Use with dark background labels. Mark - Black mark on underside of label. No Media Type setting avail. or required.
Print Method – Transfer* - Use of ribbon. Direct - No ribbon used.	QUICK SETUP Menu, Print Mode - Transfer* or Direct .

Table 2: ZGL Menu (continued)

Zebra Xiii Series	SL5000r/T5000r with ZGL Emulation
Print Width - Width of image to be printed in Inches, MM or Dots. Printer width dependent.	QUICK SETUP Menu, Label Width - Width of image to be printed in Inches or MM. Printer width dependent.
Label Length - Printable length of label in Inches or MM.	QUICK SETUP Menu, Label Length - Printable length of label in Inches or MM.
Maximum Length - Used to assist in media calibration only.	CALIBRATE CTRL Menu, Use Label Length – (Enable*) Uses Label Length value in QUICK SETUP menu to assist in Auto Calibrate procedure.
Parallel Comm. - Parallel* Twinax/Coax (option)	PARALLEL PORT Menu, Port Type - IEEE 1284* , Disable or Centronics. NOTE: Use C/T PORT Menu if Coax/Twinax option installed.
Serial Comm. - RS232* , RS422/485 or RS485 multidrop.	SERIAL PORT Menu, Port Type - RS232* , RS422 or Disable.
Baud - (110 - 57600) 9600*	Baud Rate - (600 - 115200) 9600*
Data Bits - 7-bits* or 8-bits	Word Length 7 or 8*
Parity - (Even* , Odd or None)	Parity - (Even, Odd or None*)
Stop Bits - 1 stop bit* or 2 stop bits	Stop Bits - 1* or 2
Host Handshake - XON/XOFF* , DTR/DSR Protocol - None* , Zebra or ACK/NAK	Data Protocol - XON/XOFF* , ETX/ACK, ACK/NAK, Series 1 Char, Series 2 Char or DTR
Network ID (000* - 999) used for RS-422/RS-485 Network only.	N/A
Communications - Normal Mode* - Prints label image. Diagnostics - All data sent from host printed in ASCII hex chars.	NOTE: Ptr Defaults to Normal Mode Comm. Hex Dump (same as Zebra Diagnostic Mode) can be Enabled in DIAGNOSTIC Menu .
Control Prefix - (00 – FF) Hex 7E*	PPI/ZGL SETUP Menu, Command Prefix - (1-255) 126* . = Hex 7E*
Format Prefix - (00-FF) Hex 5E*	Label Prefix - (1 to 255) 94* . = Hex 5E*
Delimiter Char. - (00-FF) Hex 2C*	Delimiter - (1 to 255) 44* . = Hex 2C*
ZPL Mode - ZPLII* , ZPL	ZPL Compatibility - ZPL-II* , ZPL-1

Table 2: ZGL Menu (continued)

Zebra Xiii Series	SL5000r/T5000r with ZGL Emulation
<p>Media Power Up - Media action when the printer is powered up. Feed* - Feeds a label to 1st web. Calibration - Recalibrates media when printer is powered up.</p> <p>Length - Determines length of label.</p> <p>No Motion - Media does not move.</p>	<p>CALIBRATE CTRL Menu,</p> <p>NOTE: SL5000r/T5000r auto feeds a blank label to 1st web (gap) when first print job is sent. Pwr Up Auto-Cal - (Disable*, Enable) Disable* - No recalibrate at power-up. Enable - Recalibrates media when printer is powered up.</p> <p>MEDIA CONTROL Menu,</p> <p>Set Label Length - Manual* - Label Length set in menu. Automatic - Auto Calibrate Sensed Distance value used to set Label Length. N/A</p>
<p>Head Close - Media action after the printhead is closed. Feed* - Feeds a label to 1st web. Calibration - Recalibrates media. Length - Determines length of label. No Motion - Media does not move.</p>	<p>N/A (No menu option available). NOTE: After printhead is closed, SL5000r/T5000r auto feeds a blank label to first web (gap) when first print job is sent. N/A N/A N/A</p>
<p>Backfeed - (Default*, after, before, 10 to 90%, off). Establishes when & how much label backfeed occurs after a label is cut or peeled-off.</p>	<p>N/A Distance back to TOF position of label under printhead is auto controlled by SL5000r/T5000r regardless of Paper Feed Shift value when using; Cut, Tear-Off, Tear-Off Strip & Peel-Off Media Handling modes.</p>
<p>Label Top - (-120 to +120 dot rows) +00*. Adjusts vertical print position on label.</p>	<p>QUICK SETUP Menu, Ver Image Shift - (-1 to +12.8") 0.0**. Adjusts vertical print position on label.</p> <p style="text-align: center;"><u>Or</u></p> <p>PPI/ZGL SETUP Menu, Top Position - (-100 to +100 dots/inch) 0 dots/inch*. Adj vert. position in dot/in. NOTE: Only avail. in later version SW.</p>
<p>Left Position - (-9999 to +9999) 0000*. Adjusts image horizontally from left edge of label in dots. (+) shifts image left. (-) shifts to right.</p>	<p>QUICK SETUP Menu, Hor Image Shift - (-1.0 to +1.0) 0.0**. Adjusts image horizontally from left edge of label in inches. (+) shifts image left. (-) shifts image right.</p> <p style="text-align: center;"><u>Or</u></p> <p>PPI/ZGL SETUP Menu, Left Position - (-1000 to +1000 dots) 0 dots*. Adjusts image horiz. in dots. NOTE: Only avail. in later version SW.</p>
<p>Head Test Count- (0000*-9999) 0000 disables test.</p>	<p>DIAGNOSTIC Menu, Ptr Media Dist - Inches*, MM.</p>

Table 2: ZGL Menu (continued)

Zebra Xiii Series	SL5000r/T5000r with ZGL Emulation
Head Resistor - Must be updated when printhead changed.	NOTE: Head Resistance detected & updated automatically by SW.
Verifier Port - How printer reacts to Optional On-Line Verifier. Off* - Verifier port is off. 1 VER-RPRINT - Label reprinted if error detected. 2 VER-THRUPUT - Allows greatest throughput but may not indicate verification error immediately.	Off - Default if no validator installed. VALIDATOR Menu (Opt), Validator Funct. - Enable* , Disable. Automatically Enabled when opt installed. Disable = Validator turned off. Validator Action - Retry Form* - Label reprinted if error detected.
Applicator Port	N/A
Web S. - Auto set during calibrate.	Automatically set during Auto Calibrate.
Media S. Auto set during calibrate.	Automatically set during Auto Calibrate.
Ribbon S. - Auto set during calibrate.	Automatically set after power up, while printing and when printhead is opened then closed.
Mark S. - Auto set during calibrate.	Automatically set during Auto Calibrate.
Mark Med S. - Auto set during calibrate.	Automatically set during Auto Calibrate.
Media LED - Automatically set during calibrate.	Automatically set during Auto Calibrate.
Ribbon LED - Automatically set during calibrate.	Automatically set during Auto Calibrate.
Mark LED - Automatically set during calibrate.	Automatically set during Auto Calibrate
LCD Adjust- Adj. display brightness.	N/A
Resolution - Full*, Half.	PPI/ZGL SETUP Menu, Resolution Mode - Full*, Half
Firmware - Firmware version & part number printed.	DIAGNOSTIC Menu, Software Build & Config printout
Language - Sets the display language. English* , Spanish, French, German, Italian, Norwegian, Portuguese, Swedish, Danish, Spanish2, Dutch, Finnish, Custom.	PRINTER CONTROL Menu, Display Language - English* , Spanish, French, German, Italian, Portuguese.

Table 2: ZGL Menu (continued)

Zebra Xiii Series	SL5000r/T5000r with ZGL Emulation
<p>Save Settings - Permanent* - Saves changes even after power is turned off. Temporary - Saves until changed again or until power is turned off.</p> <p>Cancel - Cancels all changes since entering Config mode.</p> <p>Load defaults - Loads Factory defaults.</p> <p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p>	<p>CONFIG CONTROL Menu, Save Config. - Saves changes to 8 cust. Configs. (same as Zebra Permanent). NOTE: Changes to all configs. act same as Zebra Temporary mode unless config. saved as 1 of 8 custom Configs. Cancel N/A - Printer auto cancels like Zebra if Config changes are not saved or if another Config is loaded. Load Config. - Loads Factory default and 1-8 custom configurations. Power-Up Config - Selects Factory or 1 of 8 custom Configs. as power-up configuration. Delete Config. - Deletes any of up to 8 saved custom configurations. Print Config. - Prints Factory, Pwr-Up, Current, All, or custom Configs. 1-8. Protect Configs. - When enabled, prevents saving & overwriting any existing saved custom Config. Name Config. 1-8 - Permits using up to 15 characters to name a custom Config.</p>
<p>Format Convert – (None*, 150-300, 150-600, 200-600, 300-600). Selects the bitmap scaling factor.</p>	<p>PPI/ZGL SETUP Menu, Resolution Mode - Full*, Half</p>
<p>Idle Display (opt)- (Firmware ver, mm/dd/yy (24 hr), dd/mm/yy (24 hr), mm/dd/yy (12 hr), dd/mm/yy (12)). Sets LCD display options for real time clock, if installed.</p>	<p>N/A</p>
<p>Set Date (opt) mm/dd/yy dd/mm/yy</p>	<p>N/A</p>
<p>Set Time (opt) 24 hour 12 hour</p>	<p>N/A</p>
<p>IP Resolution (opt) - Dynamic* - Server selects IP Address. Permanent - User selects IP Address.</p>	<p>N/A</p>
<p>IP Protocols (opt) - (All*, Gleaning only, RARP, BOOTP, DHCP). If Dynamic set in IP Resolution, this selection determines method(s) that the PrintServer will receive the IP Address from the server.</p>	<p>N/A</p>

Table 2: ZGL Menu (continued)

Zebra Xiii Series	SL5000r/T5000r with ZGL Emulation
<p>Subnet Mask (opt) - Dynamic - User may set, but server can assign. Permanent* - User must set.</p>	<p>ETHERNET ADDRESS Menu, (opt) Subnet Mask - User sets Subnet Mask for TCP/IP protocol unless it is Dynamic, then read-only.</p>
<p>Default Gateway (opt) -Sets Gateway Address.</p>	<p>ETHERNET ADDRESS Menu, (opt) Gateway Address - Sets Gateway Address.</p>
<p>Print Speed - N/A in menu. Selected via software sent from host.</p>	<p>QUICK SETUP Menu, Print Speed - (2 to 10 ips). Printer width & model dependent. Also, selectable via software sent from host.</p>
<p>Orientation - N/A in menu. Selected via software sent from host.</p>	<p>QUICK SETUP Menu, Orientation - Portrait*, Landscape, Inv-Portrait, Inv-Landscape.</p>

B

ZGL-DBCS

Overview

This appendix describes the additional and unique commands for

- T5000 ThermaLine ZGL-DBCS Series

The T5000 ThermaLine ZGL-DBCS include the ZGL-Hangul, ZGL-HanziGB, and ZGL-JAP emulation software

ZGL-DBCS is an extension to the existing ZGL (ASCII) emulation supporting Korean KSC, Chinese GB, and Japanese Shift-JIS character printing. The differences between those printers are as follows:

- ZGL-Hangul supports the KSC code table for Korean character code points used only in South Korea.
- ZGL-HanziGB supports the GB code table for simplified Hanzi character code points used in the People's Republic of China.
- ZGL-JAP supports the Shift-JIS code table for Kanji character code points used in Japan.

The above differences affect only the DBCS code points, but the command syntax and the behavior are similar.

ZGL-DBCS Series

The ZGL-DBCS series include ZGL-Hangul, ZGL-HanziGB, and ZGL-JAP emulation software.

High Byte Menu

The menu selection “HIGH BYTE” on the Front Panel under MENU MODE -> PGL/ZGL SETUP turns the most significant bit on or off.

When “HIGH BYTE” is set to “Disable”, the most significant bit will be turned off and the code point exceeding 0x7F will be skipped. For example, the input code point “0x3061” will be mapped to “0xB0E1” automatically. If the input code point is “0xB0E1”, it will be skipped.

When “HIGH BYTE” is set to “Enable”, and the leading byte of data exceeds 0x7F, it will be combined with the following byte to form a two-byte code point. On the other hand, if the first byte is less than 0x80, it will be treated as a single-byte code point for printing.

The default settings for the High Byte Menu are:

- ZGL HanziGB - DISABLE
- ZGL Hangul - ENABLE
- ZGL JAP - ENABLE

Command Syntax

The double-byte characters can only be printed if both the `^A<DBCS font identifier>` command and the `^CI14` or `^CI15` or `^CI22` commands are received. The `^CI14`, `^CI15`, and `^CI22` commands can work on all ZGL-DBCS emulations to select the DBCS character set. The order in which the `^CI` and `^A` commands are received is not important.

(A) Select Alphanumeric Font Command

Purpose Allows you to select the alphanumeric font, orientation, and magnification.

When the DBCS character set is selected and if the `font_id` is mapped to a DBCS font, the (A) command can be used to magnify and orientate the double-byte characters. The default DBCS font identifier is “1” for all DBCS-ZGL builds.

Format `^ Afont_id {orit}, height, width`

^A Selects the Alphanumeric Font command.

font_id Selects the font choice from:

A through H - non-proportional (Default)

0 - scalable

Acceptable value: A-Z and 0-9

Orit Font orientation:
N - No rotation (Default)
R - Rotate 90 degrees clockwise
I - Inverted
B - Rotate 270 degrees clockwise

For Scalable fonts:

Height Individual character height in printer dots
Default value: 10 dots
Acceptable value: 10 to 1500

Width Individual character width in printer dots
Default value: 10 dots
Acceptable value: 10 to 1500

NOTE: If ^CI14 or ^CI15 or ^CI22 is not received, even though the font identifier maps to a DBCS font, the functionality of ^Ax will also be the same as it is in the ZGL emulation.

(B) Select International Set Command

Purpose This command selects the DBCS character set for printing double-byte characters.

Format ^ *CIfont_id*

^CI Selects International Set Command

font_id International Font selection
Default is 0 (US-ASCII)
14, 15, or 22 - DBCS character Set

NOTE: The functionality of ^CI is the same as it is in the ZGL emulation, if *font_id* is not a DBCS font identifier.

(C) Font Identifier Command

Purpose This command assigns a one-character identifier to a built-in or downloaded font.

Syntax ^ *CWfont_id*, {*src:*}*fname*

^CW Font Identifier command.

font_id The internal character (0-9, A-Z) to be used to identify a font to be substituted or the new font to be added. No default; one character is required for this parameter.

{*src:*} Device source where the font is stored or to be stored.

fname Name of font to be downloaded or as additional font.

The file extension is fixed at .FNT.

Default is "UNKNOWN".

NOTE: The additional downloadable fonts include:

ZGL Hanzi GB – MSUNG.FNT

ZGL Hangul – KGOthic.FNT

ZGL JAP – GOTHIC24.FNT

C

Contact Information

Printronix Customer Support Center

IMPORTANT Please have the following information available prior to calling the Printronix Customer Support Center:

- Model number
- Serial number (located on the back of the printer)
- Installed options (i.e., interface and host type if applicable to the problem)
- Configuration printout:

Thermal Printer

See "Printing A Configuration" in the *Quick Setup Guide*.

Line Matrix Printer

Press PRT CONFIG on the control panel, then press Enter.

- Is the problem with a new install or an existing printer?
- Description of the problem (be specific)
- Good and bad samples that clearly show the problem (faxing of these samples may be required)

Americas (714) 368-2686

Europe, Middle East, and Africa (31) 24 6489 311

Asia Pacific (65) 6548 4114

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